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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,618	06/23/2005	Graham Reed	FHW-142US	9016
959	7590	07/05/2006	EXAMINER	
LAHIVE & COCKFIELD 28 STATE STREET BOSTON, MA 02109			LEPISTO, RYAN A	
			ART UNIT	PAPER NUMBER
			2883	

DATE MAILED: 07/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/540,618	REED ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Ryan Lepisto	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 14 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/23/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed 23 June 2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each non-patent literature publication. It has been placed in the application file, but the information referred to therein has not been considered and therefore has been lined through to indicate that this reference has not been considered.

### ***Drawings***

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:  $h_b$ ,  $H$ ,  $h_a$ ,  $n_0$ ,  $n_b$ ,  $n_a$ ,  $n_s$ ,  $L$ ,  $L_1$ ,  $L_2$ ,  $\Lambda_1$ ,  $\Lambda_2$ . Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the

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reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

4. **Claims 14 and 15** are objected to because of the following informalities: Both of these claims depend from claim 13, which states that the layered structure comprising one or more layers of semiconductor, or dielectric material or both. Claims 14 and 15 go on to claim specific semiconductor or dielectric materials. This is improper because the parent claims states that there can be just semiconductor (claim 15 would then lack proper antecedent basis) or just dielectric (claim 14 would then lack proper antecedent basis). Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-6, 8-17 and 22** are rejected under 35 U.S.C. 102(b) as being anticipated by **Shibata et al (US 5,444,802)** (Shibata). Shibata teaches two main embodiments of an optical coupler (first embodiment – Figs. 7-8, 14, 17 and second embodiment – Figs. 10, 13, 17). The first embodiment (column 6 lines 10-26, 34-36; column 7 lines 2-15, 46-50, 62-64; column 8 lines 1-7, 19-29, 62-68; column 9 lines 1-2) comprises an input waveguide (14a or 14b), an intermediate waveguide (14c), an output waveguide (14d) that is shorter than the intermediate waveguide (14c), a first grating (13) between intermediate (14c) and input (14a or 14b) waveguides, a second grating (16) having a different length than the first grating (13) (Fig. 8) between intermediate (14c) and output (14d) waveguides where the first grating (13) directionally couples light from the input waveguide (14a or 14b) to the intermediate waveguide (14c) and the second grating (16) couples light from the intermediate waveguide (14c) to the output waveguide (14d) wherein the coupler is a multilayered structure wherein the waveguides (either rib waveguides, Fig. 7 or embedded waveguides, Fig. 17) form a GaAs semiconductor or glass dielectric layer (11a, column 9 line 65 – column 10 line 13) and the gratings form another layer (10).

The second embodiment (Figs. 10, 13 and 17) comprising an input waveguide (18), intermediate waveguide (14) that is longer than the input waveguide (18), output waveguide (not labeled, the mirror of 18) wherein the waveguides are either separated by an air boundary when formed as rib waveguides (Fig. 10) or a substrate boundary

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when formed as embedded waveguides (Fig. 17), a first grating (16) between the input waveguide (18) and center portion of the intermediate waveguide (14), a second grating (16') between the center portion of the intermediate waveguide (14) and the output waveguide (mirror of 18) wherein the gratings are used to directionally couple between the respective waveguides (column 9 lines 41-54, column 10 lines 42-58) by using a control signal to change the refractive indices of neighboring waveguides so they have a index difference (column 8 lines 26-29) wherein the coupler is a multilayered structure wherein the waveguides (either rib waveguides, Fig. 7 or embedded waveguides, Fig. 17) form a GaAs semiconductor or glass dielectric layer (11a, column 9 line 65 – column 10 line 13) and the gratings form another layer (10).

6. **Claims 1, 5-6, 8, 11, 16-18 and 20-21** are rejected under 35 U.S.C. 102(b) as being anticipated by **Handa (US 4,776,661)**. Handa teaches an optical coupler (Fig. 20, column 12 line 59 – column 13 line 17) comprising a semiconductor input waveguide (29c) that couples laser light from a laser source (27c), an semiconductor intermediate waveguide (41c), a semiconductor output waveguide (31) that is longer than the intermediate waveguide, a first grating (37c) for coupling laser light from the first waveguide (29c) to the intermediate waveguide (41c), a second grating (35c) having a different grating structure as the first for coupling light from the intermediate waveguide (41c) to the output waveguide (31) and an external optical fiber (33) that couples the light from the output waveguide (31) to an external location wherein the rib waveguides

(29c, 31) may be formed as embedded waveguides (Fig. 22) having refractive indices greater than the intermediate slab waveguides (column 14 lines 5-10).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata as applied to claims 1-6, 8-17 and 22 above, and further in view of what would have been obvious to one of ordinary skill in the art at the time of applicant's invention and in view of the teaches of Shibata.

Shibata teaches the coupler previously described.

Shibata does not teach expressly the output waveguide having a refractive index greater than the intermediate and input waveguides and the intermediate waveguide having a refractive index greater than the input waveguide.

Shibata does teach that the refractive indices of the waveguide may be changed by the electric field of a control signal so promote coupling between waveguides (column 8 lines 26-29).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to create any needed refractive index difference boundary between

waveguides to promote coupling as taught by Shibata including the relationship claimed.

Applicant has not disclosed that this exact relationship provides an advantage, is used for a particular purpose, or solves a stated problem and therefore lacks criticality.

The motivation for doing so would have been increase coupling efficiency and saving energy by using known effects (Kerr effect) to change the refractive indices of material instead of more costly electrical means.

8. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata as applied to claims 1-6, 8-17 and 22 above, and further in view of **Sakata et al (US 5,140,149)** (Sakata).

Shibata teaches the coupler previously described.

Shibata does not teach expressly the structure as a photodiode.

Sakata teaches a embedded waveguide structure (Fig. 7 for example) using gratings (206) to couple light between waveguides.

Shibata and Sakata are analogous art because they are from the same field of endeavor, grating coupling.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to that the structure taught by Shibata can be used for detection since the claim limitation does not add any additional structure to claim 1, only a function and since Sakata teaches waveguide/grating coupling can be used as photodiodes.



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While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. >In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also In re Swinehart, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); < In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

The motivation for doing so would have been to increase application in which the grating coupler can be employed by using field intensity distributions of the even and odd modes from gratings and use them as a photo-sensor (Sakata, column 7 lines 39-46).

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Domash et al (US 6,771,857 B1) at least anticipates claim 1.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-Th 7:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ryan Lepisto

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Date: 5/8/06



Frank Font

Supervisory Patent Examiner

Technology Center 2800